

# PATENT SPECIFICATION

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DRAWINGS ATTACHED



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## (54) CONTAINER MADE OF THERMOPLASTIC MATERIAL

(71) We, FARBWERKE HOECHST AKTIENGESellschaft, vormals MEISTER LUCIUS & BRUNING, a body corporate organised according to the laws of Germany, of 6230 Frankfurt (Main) 80, Postfach 80 03 20, Germany, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

Wide-necked containers made of thermoplastics materials and having closures that are impermeable to liquids have been previously proposed. Such containers are generally provided with a closure consisting of a clamping ring made of metal, a cover with a sealing lip, and possibly an annular sealing element.

For storing and shipping granular, pasty and pulverulent materials in large quantities, large cans, drums and other wide-necked containers having the shape of drums and cubes are generally used. These containers are usually made of sheet metal, wood, plastics or cardboard. Plastics materials have the advantage that they have a good resistance to shock and impact, and, as they do not swell in water, their strength is not affected under humid conditions. Containers made of plastics materials can therefore be used for a wide variety of purposes and ensure a high safety in transport. It is for this reason that there exists a growing demand for wide-necked containers made of thermoplastics materials, especially polyethylene.

A clamping ring made of metal is preferably used to close a container consisting of a wide-necked receptacle and a cover. With the previously proposed forms of construction, the neck of the receptacle is provided with a flange or collar. The cover, which may be provided with an annular sealing element or fitment, is put on the edge

of the neck and a tight closure is produced between the flange of the neck and the rim of the cover, by the pressure arising from the circular clamping, by the clamping ring. To centre the cover and to improve its stiffness, it may be retracted within the sealing edge or provided with a lip on the inner side.

International test specifications stipulate that a container must remain impermeable to liquids when it is dropped from a height of 1.2 metres in such a way that it falls on the closure, with an angle of 45° between the direction of fall and the longitudinal axis of the container. Tests have shown that wide-necked containers of thermoplastic material having previously proposed closure means do not, with certainty, meet these demands, because of the special deformation characteristics of the thermoplastics material, that is its high elastic compliance and resilience.

The present invention provides a container comprising:

- (a) a receptacle that comprises a thermoplastic material and has a neck of circular cross-section, one end of which neck is open and the other end of which communicates with the interior of the vessel, the neck having a cylindrical portion adjacent to the open end thereof, an inwardly extending constriction adjacent to the other end thereof, and an outwardly extending projection between the cylindrical portion and the constriction,
- (b) a cover for the open end of the neck, the cover comprising a thermoplastic material and having a brim and a lip such that when the cover is on the receptacle the brim is disposed outside the neck and contacts or is adjacent to that outer surface of the projection that is nearer the cylindrical portion and the lip is disposed inside the neck and con-

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tacts or is adjacent to the surface of the constriction that is nearer the cylindrical portion, so that the brim and the lip are capable of contacting their respective adjacent surfaces, if not already so doing, under the action of an axial or oblique force, and

- (c) a clamping ring for clamping the cover onto the receptacle, the clamping ring being of such a shape that part of it can extend into, and engage an outer surface of, the constriction.

The design of the cover and neck of the container of the invention is especially suitable for wide-necked containers, that is those containers the neck of which has a diameter nearly as great as the diameter of the body of the container. When the construction of the present invention is used for wide-necked containers of thermoplastic materials the requirements of the international test specifications are met with greater certainty.

When a container constructed in accordance with the present invention is under the action of axial or oblique forces, the cover will rest with the brim on the outer surface of the projection of the neck and with the lip on the upper inside surface of the annular groove-like constriction in the lower part of the neck, thus providing a liquid-tight seal between said lip and said surface. The clamping ring fully engages in the annular constriction and, with a tight closure, it also takes up the axial forces transmitted from the cover to the neck of the container.

Such a design ensures that when axial forces act on the container the brim of the cover is not bent off, and under the action of oblique forces, neither the cover nor the neck become deformed, so that leakage is avoided. The brim of the cover and the projection of the neck preferably have the same outside radius. The annular groove defined by the brim of the cover and the lip can be provided, at its base, with an undercut to hold a sealing ring. The central part of the cover is preferably arranged to adjoin the side of the lip at a position approximately halfway between the bottom of the lip and the uppermost part of the groove formed between the brim and the lip, thus resulting in a radial reinforcement of the lip. For further reinforcement, radial reinforcing ribs may be provided on the cover.

The container may be cylindrical, cuboid or barrel-shaped. The bottom of the receptacle and the cover may be shaped such that the containers can be stacked on top of one another without the danger of them sliding. Furthermore, the containers are preferably provided with collapsible handles.

The invention will now be described with reference to the accompanying drawings, in

which:

Figure 1 is a side view, partly in elevation and partly in section, of a container according to the invention;

Figure 2 is a top plan view of the container of Figure 1; and

Figure 3 is an enlarged view of part Z of Figure 1.

Referring to the drawings:

A wide-necked receptacle 1 is provided, at its neck, with an annular projection 2 and a groove-like constriction 3. A clamping ring 4, made of metal, has a lower portion 5 that engages in the groove-like constriction 3 of the neck. A cover 6 has a brim 7 disposed outside the receptacle neck and an annular lip 8 disposed inside the neck in such a manner that it can engage on the upper inside surface of constriction 3. The cover is also provided with radial reinforcement ribs 9 and, in the annular groove defined by the brim 7 and the lip 8, a sealing ring 10. The handles 11 of the container are collapsible.

A wide-necked container constructed in accordance with the invention, the cover and receptacle of which comprised high density polyethylene (density 0.95 g/cm<sup>3</sup>) and which was closed by means of a clamping ring of sheet metal 1.25 mm thick and a sealing ring of rubber sponge, was subjected to the prescribed dropping test. The container, filled with 60 kilograms of water, was dropped from a height of 1.2 metres at an angle of 45° with respect to the direction of fall. It remained impermeable. The cover of the container had been made by injection moulding. The central part of the cover had a thickness of 3 mm and was reinforced by 8 radial ribs of the same thickness. In order to avoid stress concentration effects, all edges were rounded off with a radius of 1 mm. The brim of the cover and the lip each had a thickness of 4 mm. The annular groove between the brim of the cover and the lip had an undercut of 1 mm on either side, and the sealing ring had a cross-sectional diameter of 5 mm. The cylindrical wide-necked receptacle was made by extrusion blowing and had a weight of 3 kilograms. The wall thickness of the neck was 3.5 mm, the radius of the outer annular projection was 2.5 mm and the groove-like constriction had a radius of 5.5 mm.

WHAT WE CLAIM IS:—

1. A container comprising:
  - (a) a receptacle that comprises a thermoplastic material and has a neck of circular cross-section, one end of which neck is open and the other end of which communicates with the interior of the vessel, the neck having a cylindrical portion adjacent to the open end thereof, an inwardly extending constriction adjacent to the other end thereof, and an out-

wardly extending projection between the cylindrical portion and the constriction,

(b) a cover for the open end of the neck, the cover comprising a thermoplastic material and having a brim and a lip such that when the cover is on the receptacle the brim is disposed outside the neck and contacts or is adjacent to that outer surface of the projection that is nearer the cylindrical portion and the lip is disposed inside the neck and contacts or is adjacent to that inside surface of the constriction that is nearer the cylindrical portion, so that the brim and the lip are capable of contacting their respective adjacent surfaces, if not already so doing, under the action of an axial or oblique force, and

(c) a clamping ring for clamping the cover onto the receptacle, the clamping ring being of such a shape that part of it can extend into, and engage an outer surface of, the constriction.

2. A container as claimed in claim 1, wherein a groove defined by the brim of the cover and the lip has an undercut for a sealing ring.

3. A container as claimed in claim 1 or claim 2, wherein the cover is provided with a sealing ring in a groove defined by the brim and the lip.

4. A container as claimed in any one of claims 1 to 3, wherein the brim of the cover and the projection of the neck have the same

outside radius.

5. A container as claimed in any one of claims 1 to 4, wherein the central part of the cover is arranged to adjoin the side of the lip at a position halfway between the bottom of the lip and the uppermost part of a groove defined by the brim and the lip.

6. A container as claimed in any one of claims 1 to 5, wherein the cover has reinforcing radial ribs.

7. A container as claimed in any one of claims 1 to 6, wherein the cover and the bottom of the receptacle have shapes such that one container may be stacked on top of another.

8. A container as claimed in any one of claims 1 to 7, wherein the body of the receptacle is cylindrical, cuboid or barrel-shaped.

9. A container as claimed in any one of claims 1 to 8, wherein the container has collapsible handles.

10. A container as claimed in claim 1 and substantially as described herein.

11. A container as claimed in claim 1 and substantially as described herein with reference to and as shown in the accompanying drawings.

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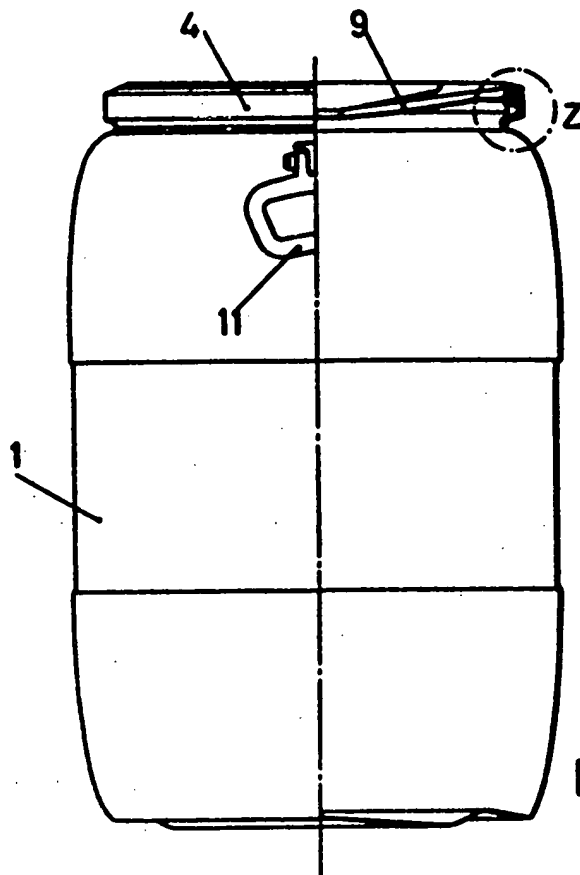


FIG. 1

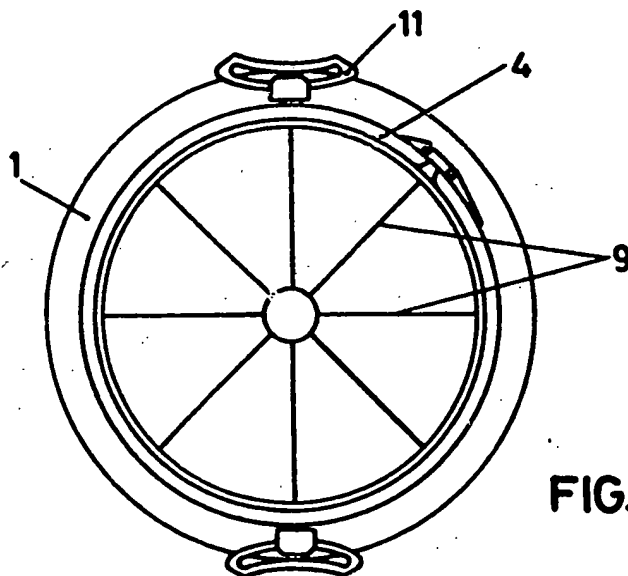


FIG. 2

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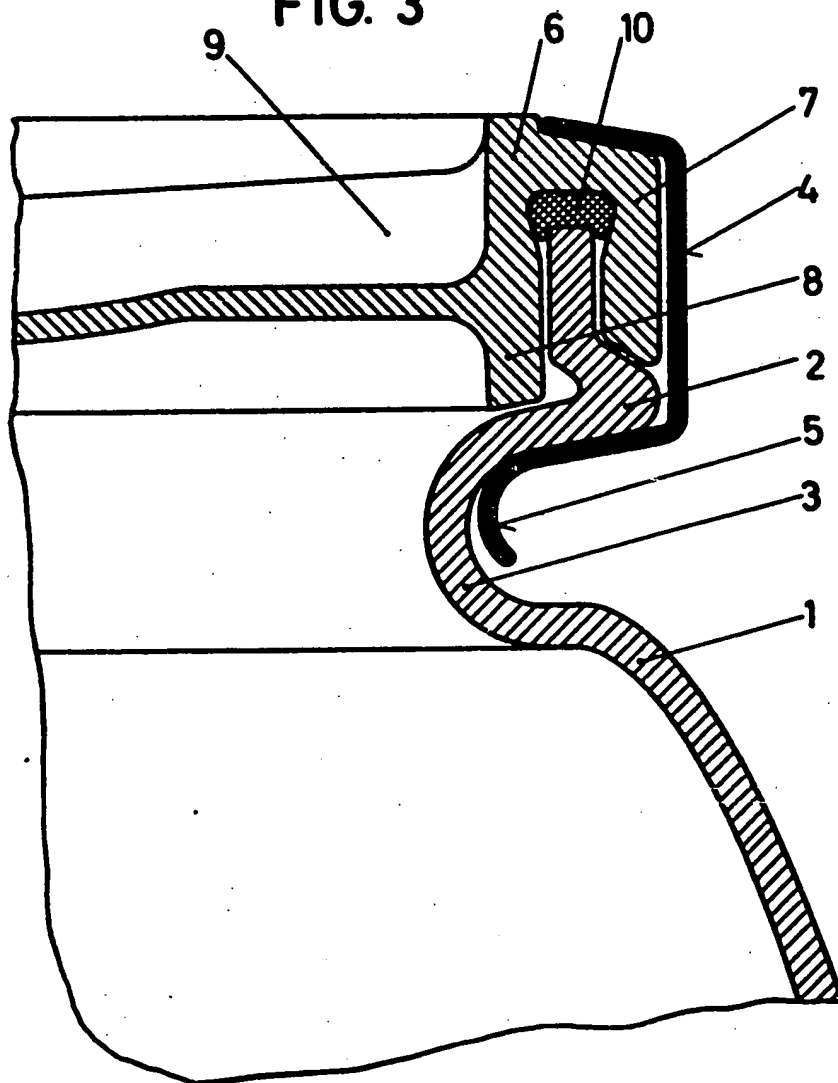
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SHEET 2

FIG. 3



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